ATGLANT ENGINEERING READINESS

NEWSLETTER 1-01

CONTENTS

Director's Comments

As we continue working on our database, some trends emerge. First the good news, material condition continues on the upswing. Most significant improvement can be seen on ships that have fully implemented a thorough, formal, detailed MLOC process, an effective material tracking system (eight o'clocks, OOC log, CSMP, etc) and an aggressive follow-up program. Of all of the administrative material tools one of the most important "pulse points" is the MLOC process. Some items to look for:

- does it conform with EOP?
- does it include all of the applicable pre lightoff PMS checks?
- are individuals assigned responsibility for the checks (by name). Are they qualified to conduct the checks?
- is a formal report made to the CHENG and CO?

As material condition continues to improve, the next challenge is to make sure your watchstanders have achieved the Level of Knowledge that is required for the watch they are standing. This includes the prerequisite system/theory knowledge. Pull some of the PQS qual sheets on your watchstanders and spot-check their LOK. Our informal deck plate discussions show significant weaknesses across almost all ship classes. Some recommendations include oral boards followed up by seminars. Much of the training can be accomplished during routine watchstanding as CHENGS and Senior Enlisted generate a climate of watchstander excellence.

Lastly, keep a close watch on major safety programs, i.e. Electrical Safety, Tag Out, Heat and Hearing. We've seen some problems with deckplate implementation. Spot checks during space walk arounds should show whether they are effective.

As always, we can assist in any of these areas. Just give us a call.

R. P. Tjepkema

TRAINING

TRAINING METHODOLOGY

By CDR Julia A. Roos

Ref: (a) OPNAVINST 3120.32C

There continues to be a lot of confusion concerning shipboard or engineering department-training programs.

Chapter 8 of reference (a) is the primary guide to be used in developing a shipboard or department training program and should be the first place you go. Here are some of the more common problems with shipboard training programs:

- The training organization was not setup in accordance with reference (a) paragraph 805, which states that "training should be conducted using the training group concept".
- The Long Range Training Plan did not include an annual employment schedule and a list all required exams, inspections, certifications and assist visits.
- The ship's Required Exercise List did not include the exercise periodicity requirements and the date the exercise was last accomplished.
- The ship's Required Schools List did not include required NEC's and did not identify those ship's personnel who held the qualifications or were graduates of the required schools.
- The ship's List of Required Lesson Topics for each department did not always identify which lessons addressed PQS fundamentals and systems.

A Training Group is defined as any group of personnel to be organized for training. Each Training Group is assigned a Training Group Supervisor who is responsible for the administration of training within that group. Training Groups can be created at all levels. For example, creating a Training Group for each engineering watchstation and assigning your best watchstander as the Training Group Supervisor can pay big dividends. That individual would then be responsible for monitoring the training for all members of that group and for documenting the completion of the conducted training. You can have as many Training Groups, or as few, as the situation warrants.

The first priority of a good training program is to establish training guidelines, requirements and priorities. The ultimate goal should be to increase combat readiness and mission accomplishment. There should be one Training Program for the ship that addresses training procedures and requirements that are applicable to the entire crew. These include, but are not limited to, the following:

- Battle Problems
- Drills, Exercises, and Evolutions
- Team Training
- Shore Based (formal) Schools, NECs, etc.
- Professional Training
- General Military Training (GMT)
- On the Job Training (OJT)
- PQS Training
- ESWS Training
- In-rate Training
- Self-Study
- Officer Training

The Training Program should also establish training priorities. Here is how one Norfolk-based-ship prioritized training:

(1) Drills, Exercises, Evolutions required by higher authority
(2) Team Training
(3) Watchstander Qualification
(4) Departmental/Divisional/Training Group Instruction
(5) Other PQS Instruction
(6) General Military Instruction

Another thing this ship did was to establish a “Ship Area Coordinator.” The “Ship Area Coordinator” is responsible for training a particular group/team of personnel, when that team is composed of personnel from more than one department or is a mission critical team. Examples include: Supply Officer for Repair Parts Petty Officer training; Damage Control Assistant for Damage Control Training Team, Fire Party, Rescue and Assistance Detail and Duty In-port Emergency Team, Damage Control Petty Officer training; Safety Officer for Safety Petty Officer training, Engineering Officer for Engineering Casualty Control Training Team training; Combat Systems Officer for Combat Systems Team training; Command Master Chief for ESWS/EAWS training; Electrical Officer for electrical safety training; Repair Locker Leaders for personnel assigned to their Repair Locker, etc. The Ship Area Coordinator schedules, via PB4T, “special group” classroom, drill, and evolution instruction for personnel in that training group as often as required to maintain proficiency.

Shipboard training instructions should

address the entire ship and incorporate all the requirements of reference (a), along with some good practices such as a "Watch Bill Replacement Plan", and watchstander/watchteam training such as an evolution and exercise/drill matrix. Here are some suggestions:

- Require all departments, not just Engineering, to develop watchbill replacement plans and watchstander/watchteam proficiency plans.
- Ensure that the departmental quarterly and monthly training plans include evolution training, exercises, and casualty control drills.
- Evolution, exercise and casualty control training matrices should identify the frequency per training period that a specific evolution, exercise or casualty control drill should be satisfactorily completed in order to maintain watchstander or watchteam proficiency.

The responsibility for training the crew has been returned to the Commanding Officer. Training also remains an integral part of each crewmember's duty. The best way to accomplish this is with clear, concise guidance from the Commanding Officer for all hands to execute.

DCTT BRIEFS

By LCDR Del Bena

Well planned DCTT briefs take place on ships where it is obvious that the DCTT members are committed to excellence, that a great deal of effort and training has taken place on the deckplates, and that the leadership is proactively incorporating required and useful information into their briefs. These ships have recognized that an excellent brief can equip a motivated DCTT to provide the best training/evaluation environment for its crew. The same principles apply to the ETT portion of the brief.

Several key elements (listed below) can assist your DCTT thinking through and reviewing the drill process and developing a brief that works well for you. It is important the ETT and DCTT coordinate their simulations and impositions. Any differences between the ETT and DCTT only detract from the quality of training. The components of an effective DCTT brief should include:

Introductory Page
- DCTT names and assignments
- What the drill is (name), drill level (ie basic, intermediate, advanced)
- General Description of the event
- Training Objectives to be assessed during the drill
- Communication methods (Pri/Sec)
- Lessons learned from previous drills
- ORM analysis
- Safety walkthru time
- Heat stress survey time (if required)
- Flammable source and Heat source
- Training time out/safety precautions info
  - Drill start time/signal for DCTT to take station
  - When will the time check be conducted
  - Plant Status, OOC and degraded equipment
- Reviewed and Approved by blocks

DCTT Procedures
- Are there accesses that cannot be closed due to ongoing work?
- Type of scenario (halon good/bad)
- Full or partial mechanical and electrical isolation, and any exceptions
- Getting training aids on station (i.e. smoke machine, props, etc)
- Status of AFFF stations
- Heat stress policy (i.e. restart ventilation at 110 deg F, relax ensembles at 120 deg F) (policy to be set by the CO)
- Location of OBA change out areas or SCBA charging stations
- Location of hot spots and hangfires (if required)
- AFFF usage rates
- What makes halon bad and if so will lighting be damaged/out
- What are some reasonable, alternate actions watchstanders may take
- How will the space be entered (1 or 2 hoses, or vertical entry)
- Props and locations for halon good/halon bad indications

The Drill (initial actions)
- Size, intensity, direction of flow of the leak and fire

- What actions are required to isolate the leak?
- Will SEEDs and EEBDs be used, and if so actual or training?
- What props are used to indicate the size of the leak?
    - How will effective watchstander actions in flushing of the hazard to the bilge be demonstrated
    - What alarms and indications will be provided in CCS? (i.e. high temp/flooding alarms)
    - Coordination of alarms and indications (time delays, etc) for simultaneous drill disclosures.
    - Where will the watchstanders go after evacuation and where will evacuation reports be made?
    - Maintaining fire/smoke boundaries
    - Will hoses be charged and secured at the plug? Will bails be taped?

The Drill (re-entry)

- What type of OBA light off method will be conducted?
    - When will the fire reflash (if necessary)
    - Will ladders and deck grating be intact (ladder integrity checks, etc)?
- Who will relieve the initial fire team?
- Will hangfires start a fire if the Attack Team Leader does not discover them?
- Vapor barrier props and how will the props be disclosed?
- Will this be a multi-level fire?
- How will the bilge level prop be disclosed?

The Drill (post-fire actions)

- Will a rapid survey be conducted?
- What overhaul method will be employed?
- Will overhaul equipment be brought into the space?
- How will the space be desmoked or dewatered?
- What atmospheric testing will be conducted.

A listing of all authorized simulations and DCTT props.

Safety walk-through checklists

Again, this list is not “all inclusive”. The statement "train the way you fight", will press DCTT's ability to minimize training simulations. DCTT must also be prepared for contingencies based upon watchstander and fire party actions. DCTT may be planning for a halon good scenario, but your watchstanders or material failures may cause halon to be bad. These "what ifs" should be addressed by your training team and incorporated into the DCTT brief to maximize the training value for your crew.

MANAGEMENT

INTEGRATED CALL CENTER

By CAPT J. R. Miller

This is a non-paid commercial announcement for the "Integrated Call Center" (ICC) started by NAVSEA to connect Fleet activities with supply, logistics and technical experts to assist in problem solving. Its function is to act as a single point of contact to resolve the above mentioned problems.

There are two ways to receive service when you call the ICC at 1-877-418-6824 (24 hours a day, 7 days a week, 365 days a year). You can use the interactive Voice Response System by selecting option 1 for supply information, option 2 for technical/logistics (non-supply) or remain on the line and a customer service rep will take the call. You will be asked for your name, activity and phone number to create a profile for future inquiries. Your request will then be processed and the required information provided or you will be transferred to the support provider. If all the necessary information is not available, an ICC customer service rep will call you back when it is.

For example, let's say you are in an older ship and need to repair or replace a piece of equipment that is no longer in the stock system and for which you have no technical documentation. Call the ICC. The rep will ask for what info you do have and start researching it. They can look at old APL's, etc to try to document your piece of gear. They can go to the technical community and/or the OEM to determine the availability of parts, documentation and technical assistance. The ICC will then put you in touch with whoever you need to talk to, to answer your inquiry.

The kind of problem they can help you solve is similar to one I encountered many years ago. I was serving as MPA in a FORREST SHERMAN class destroyer and while in ROH a repair activity condemned all four of the 1200/600 lb steam reducers. The APL had been discontinued, the NSN had been cancelled and the Supply System had no information on a replacement. With steam testing coming up I had a real dilemma. Someone recommended I call the OEM (Leslie Reducer, Inc) so I took a chance and lucked out. I got the right techrep, who knew what I was talking about, spoke navy supply jargon and could help. He pointed me at a replacement APL and told me where the navy had recently stocked 10 of them. Had the ICC been in business then, they would have done all this leg work for me, getting me the same answer and saving me a lot of time.

Use this outstanding resource and if you have any feedback on it let them know.

ENGINEERING DEPARTMENT ORGANIZATION AND REGULATIONS MANUAL (EDORM)

By LCDR Del Bena

Ref: (a) COMNAVSURFLANTINST 3540.22

The EDORM's purpose is clearly stated: "to provide comprehensive guidance for the safe and effective operation of the Engineering Department". The EDORM stresses the management principles deemed most essential to the safe and effective operation of the engineering department and addresses the importance of the watch officer overview in departmental operations; the importance of management programs; and, increasing the watchstander's level of knowledge of management programs and engineering systems.

There are some paragraphs in the EDORM that are directive in nature. Some of them are:

- The EDORM must be tailored to the ship, based upon that individual ship's circumstances.
- Officers and Program Managers must be aware of their responsibilities as outlined in the EDORM.
- The Commanding Officer must sign Engineering Department Temporary Standing Orders.
- Eight O'Clock Reports must be submitted with all required sections included.

- The listing of required standing orders attached to the EDORM must be complete.

Another critical element, and one of the most essential management principles in the day-to-day operation of the propulsion plant is the watchstander's level of knowledge of management programs and engineering systems.

The EDORM is a great and proven effective management tool made available for our use.

ATG ATLANTIC ENGINEERING READINESS (N43) WEB PAGE

By LCDR Del Bena

We are now online! Our web page can be found on the ATG Atlantic web site. The following information will assist you in finding our page:

a. Log onto the ATG Atlantic web site at www.atgl.spear.navy.mil
b. Click on Engineering Readiness in the left navigation.

The following information is available on our web site: How to contact us, material checklists, how to prepare for the different assessments, underway demonstration forms, governing instructions, training the training team suggestions, management programs info, and much more.

Additionally, there is a feedback form included. Please take a minute and fill it out. All recommendations are welcome, especially those on how to improve the web page and the engineering readiness process. We look forward to hearing from you. With your valuable inputs, we can provide you better info and assistance.

INTEGRATED CONDITION ASSESSMENT SYSTEM (ICAS) POLICY

By LT Chuck Smith

Ref: (a) COMNAVSURFLANT NORFOLK VA 271437Z JUN 00

Does your ship have ICAS installed? Are you using it to maintain your operating records? Reference (a) states, in part, that all ships with an operational ICAS system and software version 4.11 (or later) are required to maintain operating logs on ICAS. Ships with previous software builds are authorized to utilize ICAS but not required to do so. Reference (a) also reiterates the necessity to submit a CASREP if the ICAS hardware or software is not functioning as designed. As this article is written, Version 4.11 has been installed in 10 ships so far and should be installed in all ICAS equipped ships by February 2001.

There are two major changes that are implemented with Version 4.11. First, the log review process is streamlined, allowing supervisory personnel to save time by utilizing the option of reviewing only out of specification operating data. Version 4.11 also incorporates standard logs and operating parameters. Unfortunately this means that ships will no longer have ability to modify equipment operating parameters without prior approval from NAVSSES.

This transition to paperless operating logs with the use of ICAS will provide long-term benefits to each and every ship. The transition to ICAS, however, involves considerable training and some forethought by the Engineering Department leadership on how best to use the system. The basic references and requirements for keeping hard copy operating logs remain the same with ICAS. The requirement for daily log review by supervisory personnel does not change. Logs are still required to be maintained onboard electronically for 6 months. ICAS will automatically flag out of specification readings, but supervisory personnel must still determine the cause of the out of specification reading and record any corrective/follow-up actions taken.

When to transitioning to ICAS or updating the installed ICAS system software with a newer version, Chief Engineers should review their standing order or ship's instruction on ICAS/ operating logs to ensure it addresses the following issues:

- Interval between ICAS readings via Portable Data Terminal (PDT) while cold iron, aux

steaming, and underway. What equipment is checked hourly? Every 2 hours? Once per watch?

- Periodicity of ICAS log review by the EOOW/EDO (consider having EDO review ICAS at 4 to 6 hour intervals while cold iron).

- Periodic backup of the ICAS hard drive (recommend at least weekly). Who is responsible? When should it be done? Where will back up discs be stored?

- How often should the ICAS computer(s) be rebooted?

- The use of passwords to control access and where will those passwords be recorded.

- Specific responsibilities of the ICAS Senior Operator (see reference (a), para 7.B).

- Procedures to be followed in the event of an ICAS system failure (i.e. when do you switch to paper logs?).

- Standard ICAS phraseology.

- Watch turnover procedures.

ICAS is an effective tool for spotting trends and for reconstructing plant events, but like any other tool it must be used properly in order to yield the maximum benefit.

FUEL OIL SAMPLING

By LCDR Rick Lawrence

Ref: (a) NSTM 541
(b) OPNAVINST 5100.19C CH 2
(c) F-76 MSDS
(d) NSTM 670

Fuel sampling is a common evolution aboard ship, but there is no complete procedure available regarding how to obtain and handle these sample(s). Reference (a) provides complete requirements for sampling analysis, frequency and quality. Unfortunately, for our operators, it does not serve as a complete, usable procedure for sampling from start to finish. An option to ensure that all safety precautions are followed, proper equipment is used, and waste fuel is properly disposed of, is to develop a local fuel sampling procedure. The references above provide varying degrees of guidance and key points are summarized below.

Reference (a) section 2.4.2, and reference (b) section C1002.o, warn against skin contact with fuel, and reference (a) paragraph 2.4.2b, requires the use of “face shield, apron, and foot covers when spills may occur”. Reference (c) requires that gloves and eye protection be used when sampling fuel. Reference (d) section 4.6.3, requires that “Containers shall be protected from physical damage during handling”. This normally means that an Oil King will place the sample bottle(s) in a bucket with a rag to cushion them while transporting them to the Oil Lab for analysis.

Whatever the individual shipboard procedure you desire to use, ensure fuel samples are taken properly and watchstanders are adequately protected, the references should be researched to verify you meet all the requirements. You are still not done though! You must ensure that all of your Oil Lab personnel understand the procedure and are trained to follow it.

CLASS ADVISORIES AND THE NSWCCD-SSES DEPT 91 WEB PAGE

By LCDR Del Bena

Ref: (a) COMNAVSURFLANT NORFOLK VA 261832Z Sep 00

The semi-annual distribution of the paper/disk copies of Class Advisories (CLAD) updates has

been suspended per reference (a). The complete, up-to-date listing of all surface ship Class Advisories is now available on the NSWCCD-SSES Dept 91 web site. You can reach this site at:

HTTP://dept91.navsses.navy.mil/cladwebsite/default.htm

If your ship does not have web access or encounters other problems accessing the CLAD web site, contact your local Combatant Homeport Engineering Team (CHET). CHET can not only provide access to the CLAD web site they will be happy to assist with downloads of the necessary data.

QUALITY ASSURANCE and FERROUS FASTENERS

By LCDR Rick Lawrence

Ref: (a) NSTM 075
(b) NSTM 505
(c) NNSY ltr 200-010-97 dtd 17 Mar 97 (General Overhaul Specifications of Surface Ships (GSO))
(d) NAVSURFWARCEN CARDEROCK DIV 262045ZAPR00 (SHIP ISE ADVISORY 5-00)

Save your department some long, hard work. Take the time to train them to look for ferrous fasteners in seawater systems. Better yet, make sure ferrous fasteners don't get installed in the first place by disposing of the buckets of spare nuts and bolts that seem to grow in engineering spaces. This is a potentially serious problem onboard each of our ships. There is enough information in the references listed above on piping systems and fasteners to constitute a Ph.D. dissertation, but all hands should know that ferrous fasteners in seawater systems are bad.

Section 3.3.3.2 of reference (a) has the most succinct caution about the use of ferrous fasteners in seawater systems:

> "Ferrous (carbon steel) fasteners shall not be used in seawater or in other systems where non-ferrous piping is installed. There continues to be a recurring problem with leaks where ferrous fasteners are used in seawater systems. The piping and fittings in these systems are usually made of copper-nickel. Carbon steel fasteners will be subjected to galvanic corrosion if coupled with copper-nickel. This has not led to fastener failure but has caused failure of the flange (leakage). This can also be a major maintenance burden, as the fastener may have to be cut to facilitate disassembly. There is also a similar problem where ferrous fasteners are installed in nonferrous systems located below the bilge plates."

Reference (a) is also the most helpful document when researching the proper fasteners to use in specific systems. The caution from NSTM 075 quoted in this article is not designed to prevent safety risks from improper fasteners, but only to state that improper fasteners will eventually fail, causing leaks. The problem arises when it comes time to repair these components. Carbon steel expands and deteriorates as it corrodes. If left to the point where the component leaks, getting the old fastener out becomes a time consuming task. In a typically bad case, the component must be cut and parts of the system re-tooled to accept a new, properly selected fastener.

Ferrous fasteners in seawater systems can be found simply by looking at the fastener/system. The offending nut, stud or bolt will rust quickly and if painted, the paint will be exfoliating. To confirm any suspicions about the part, check it with a magnet. Carbon steel is magnetic. Some alloys used in seawater systems are slightly magnetic, but there will be a dramatic difference between how hard a carbon steel piece "pulls" a magnet. On older ships, ferrous fasteners are frequently found installed one or two at a time in seawater piping flanges as an improperly selected bolt or nut that has replaced a proper fastener when the flange was removed during maintenance because no one kept track of the original fasteners. On newer ships and recent repairs made by a shipyard, flanges may be entirely made up with carbon steel fasteners because the installer was provided with ferrous fasteners to perform the installation.

Be sure you check fire pumps and other cooling systems in non-propulsion plant spaces too.

Just because a seawater system has a ferrous component installed doesn't necessarily mean it will be subject to corrosion and fail. The fastener must be in contact with, or wetted by, seawater to be subject to galvanic corrosion. Foundation bolts on pumps and brackets holding seawater piping are fine - as long as there are no seawater leaks near them.

Titanium fire pumps have a unique problem and more care must be taken with these pumps because the titanium will cause galvanic corrosion of other common materials used in seawater systems. To summarize reference (d), fittings for titanium pumps must be made of titanium. Reference (d) was re-addressed as COMNAVSURFLANT NORFOLK VA 021935ZMAY00, and provides more specific information on titanium systems, including stock numbers for components known to fail.

Awareness on the part of all engineering department personnel and especially supervisors, can help in the early identification and intervention to find and remove carbon steel fasteners in salt-water systems, and will eliminate future maintenance problems.

Educate your department and let them take charge of their own work load reduction program.

ELECTRICAL ISOLATION LISTS

By LCDR Dan Lane

Ref: (a) CNSLINST 3541.1C Standard Repair Party Manual for Naval Surface Force
(b) NSTM 555 Vol 1 Revision 7

Reference (a) requires ships to prepare electrical isolation lists for each compartment in the ship. Damage Control Central and each Repair Locker should have copies incorporated into their Repair Party Leader's Notebooks as page NB 3-1. The lists should include information on all of the 110V and 440V electrical loads in the space as verified by the ship's electricians. Also, when preparing electrical isolation lists, don't forget to include control power and indicator circuits (AC or DC) as necessary.

Reference (b) section 10.3.8 requires that ships include in their Main Space Fire Doctrine a list of local and remote controls for rapid space isolation. Two examples of remote controls are switchboards and circuit breakers. Electrical isolation lists should include the designation, location, function and area served by each control. Additionally, section 10.3.8.2 requires that the switches, circuit breakers and fuses necessary to secure all electrical equipment from outside an affected space be clearly identified.

MATERIAL/ TECHNICAL

GENERAL

LESLIE CONTROL VALVES

By LT Brian A. Minard

Ref: (a) MIP A-705 (series)
(b) NAVSEA 0948-LP-098-9010 - AIR PILOT DIAPHRAGM CONTROL VALVES

Leslie valves, also known as diaphragm control or air-pilot operated valves are located throughout each ship, most commonly in the propulsion and auxiliary spaces. These valves were installed to automatically regulate a system temperature or pressure and can either make an engineer's life easier or painfully difficult. Lets face it, when Leslies work they work great, and when they don't – look out.

More and more Leslies are not operating in a system as designed. Proper maintenance of these valves appears to be the principal cause for inoperative or malfunctioning valves.

One of the more noticeable areas is the corrosion around the valve packing glands. Allowing the packing glands to leak has caused excessive corrosion of the packing glands and fasteners. This has then resulted in instability in the associated systems operation due to a binding stem. By simply adjusting the packing gland when a leak is discovered, watchstanders can prevent further corrosion and potential problems.

Leaks are not the only reasons these valves are not functioning properly. Here are some other common problems observed:

- Supply pressure to the air-pilot controller is below or above nominal operating pressure, 20 –22 psi.
- Air reducing valve strainers not cleaned IAW PMS.
- Air leaks in piping and seals.
- Valves are not stoking full travel. (Valve stroke can be obtained from label plate on the yoke)
- Valve preload not set properly (spring tension set to prevent valve opening at less than approximately 3 psi).

Reference (a) contains all the MRCs for cleaning and inspecting the air strainers and for testing the valve stroke and preload of Leslies.

Another helpful item in maintaining and operating these valves is to label each valve with the system nomenclature and the valve fail safe position in case of a loss air pressure.

This is another area where your technicians may not have received enough pipeline training or the extent of material problems goes beyond your capability and experience to troubleshoot and correct. If you suspect this to be the case, we encourage you to contact Mr. Kiser at FTSCLANT in Norfolk at DSN 564-3872 (comm 75-444-3872) extension 1366 to arrange for a Leslie System Groom. You will be surprised with the improvements in system operation.

VALVE HANDWHEEL LABELING AND COLOR CODING

By LCDR Del Bena

Ref: (a) NSTM 505

In many cases system valve handwheels are not correctly color coded or not properly labeled. It is difficult for watchstanders to align, or verify alignment of systems if the valves in piping systems are not properly coded. The color code table from reference (a) is attached as Addendum E for a ready reference.

GAS TURBINE

FFG 7 CLASS SSDG JACKET WATER SYSTEM 3-WAY TEMPERATURE VALVES

By LCDR Del Bena

It is not uncommon to observe actual SSDG high jacket water temperature casualties. The cause is often found to be that Jacket Water Leslie (pilot) valves are improperly adjusted and placed in the "manual" vice "auto" position. Addendum Three to this newsletter was developed and refined, over time, by the technical community, and was recently reviewed by FTSCLANT. I had great success using it aboard

my ship, not only in adjusting and aligning my SSDG Jacket Water System, but as a training tool for my department as well. I hope this helps you and will improve the operation of your system.

FFG-7 FSEE Checks

By LCDR Del Bena

Many FFGs are conducting their FSEE checks differently. This is perplexing, especially because each ship was using the same tech manual. Our interest was piqued, so we did some research. We found that the LM 2500 Tech Manual (S9234-AD-MMO-050/LM2500) only contains the test procedures for validating the LM 2500 electronic interfaces. Additionally, the PT speed procedure listed on page 8-220-2 is incorrect and cannot possibly work as written. We found that FTSCLANT was aware of the problem and had developed a list of recommended changes to the procedure. It will take several months to correct the techman so if you need a copy of this procedure (if you don't already have one), it can procured from your local FTSCLANT detachment or you can give us a call and we will be glad to send it to you.

STEAM

COMBINED EXHAUST RELIEF VALVES

By LCDR Rick Lawrence

Ref: (a) NSTM 505

Steam from non-condensing turbines is normally directed to the Auxiliary Exhaust System via a "combined exhaust and relief valve" (CERV). This valve functions to direct the steam to the Aux Exhaust System when the turbine is in normal operation, vents the turbine to atmosphere and can relieve pressure from the turbine casing if necessary when the turbine is secured. These valves are designed to operate in three modes: the 'Normal' operating position, the 'Relief' position, and the 'Safety' position.

Section 9.17 of reference (a) has detailed instructions and a good drawing of a typical CERV (also provided as Addendum A to this newsletter). Each valve has two seats and discs that are operated by a coupled stem. The 'Normal" position directs the turbine exhaust to the Aux Exhaust System as expected and the path to atmosphere via the auxiliary valve is locked shut by its valve stem and action by the main valve stem. In the 'Relief' position, both main and auxiliary valve stems are shut, but a spring acting upon the main disc will relieve pressure from the turbine side if required. The 'Safety' or maintenance position isolates the turbine from Aux Exhaust pressure and vents the valve and turbine casing to atmosphere via the auxiliary valve path. The main valve disc is seated from its operating stem and action of the auxiliary valve stem.

Section 9.17 of reference (a) contains several warnings about the operation of these combined exhaust relief valves. If the valve is not positioned correctly, or has certain material deficiencies, serious safety discrepancies exist. If the turbine exhaust is directed to atmosphere, it becomes hazardous to personnel. If the relief feature is disabled, the turbine is at risk.

The following are the most frequent discrepancies noted with combined exhaust relief valves along with the respective requirements from reference (a):

- The main valve handwheel is not securely fastened to its stem using a locknut and pin as required by paragraph 9.17.3.3.
- There is no operating or warning plate as required by paragraph 9.17.3.2.
- The valve is not aligned properly in the 'Safety' position while maintenance is performed on the upstream turbine.

Your watchstanders and supervisors should be familiar with these requirements to prevent potential hazards to personnel and equipment.

OPERATIONS

HOT BEARING--FORCED DRAFT BLOWER

By LCDR Rick Lawrence

Ref: (a) NSTM 079, Vol 3
(b) NSTM 554
(c) NSTM 502

Forced Draft Blower (FDB) casualties are not normally covered by EOCC. Because of their frequency, potential to impact ship's control, and lack of redundant FDBs, ships should consider developing their own procedure to handle a hot bearing in a FDB. There is more than one correct way to handle the casualty and your procedure must balance control of the casualty with optimization of maintaining propulsion. Technical guidance is available from references (a) through (c), EOCC procedures for hot bearing casualties on other equipment, and ship specific FDB technical manuals.

Unfortunately, references (a) through (c) do not define hot bearing criteria for a FDB, nor are they particularly helpful in defining or providing specific actions to take for casualty control. Reference (a) is written in very general terms from the standpoint of a lost blower and references (b) and (c) only cover the general aspects of FDB operation. As always, your ship's procedure should provide sufficient detail to give the watchstanders adequate guidance to follow in most situations.

Here is some information and suggestions to be used in developing a new FDB casualty control procedure or evaluating your present one. Although not inclusive, the choice of criteria in determining whether or not a hot bearing exists should made from among the following:

- Bearing/oil temperatures or temperature rise across the bearing are above normal. The FDB should be secured if bearing temperature exceeds 180 deg F or exceeds a 50 deg F rise in oil temp across the bearing (reference(c)).
- A rapid rise in temperature. Some casualty procedures quantify the rise by 1 or 2 deg F/min.
- Bearing cover is excessively hot to the touch.
- A bearing high temperature alarm sounds.
- Bearing is emitting smoke.
- Unusual noise or vibration is emanating from the vicinity of the bearing.

Controlling actions that should be taken when the initial increase in bearing temperature is detected may include:

- Setting a bearing watch.
- Checking surrounding or other bearing temperatures.
- Verifying operation of the cooling water system, and increasing cooling water flow to the lube oil cooler if required.
- Verifying lube oil sump level.
- Verifying lube oil system alignment and pressures.
- Verifying oil flow through all SFIs.
- Checking for excess gland leakoff.
- Notifying the EOOW/OOD and reporting maximum speed available.

If the temperature continues to rise, the casualty obviously becomes more complex, both from a technical and ship control perspective. The decision must be made to either increase the speed on an unaffected blower or lower speed of the affected blower. This will be ship dependent, and most configurations limit the speed differences to 300 RPM to prevent "panting". At some point the ship may have to be slowed to control the bearing temperature, and speed limited to that which one blower can safely provide. The Restricted Maneuvering Doctrine may need to specifically address this casualty. If one blower is used, the affected blower should be operated at minimum speed while the cause of the casualty is determined and the bearing kept from seizing.

Once you have written the casualty procedure and promulgated it to the watchstanders, they will need to be trained on the procedure and then the drill will need to be included in BECCE sets for maintaining watchstander proficiency. Not only will this lead to improved watchteam proficiency in handling the casualty; it will also provide valuable feedback for any adjustments that might be required to your procedure.

DDG 51 GTMI's and GTGI's

By LCDR Del Bena

Gas Turbine ships are having difficulty conducting proper gas turbine moduke inspections. Why is this the case? Primarily, it's a training issue because junior personnel do not know what to look for when conducting a detailed GTMI or GTGI. With the assistance of GSMC(SW) Purkey from ATRC Det Philadelphia, Addendum D of this newsletter has been developed to assist in training maintenance personnel and can be placed in the GTMI/GTGI folder with a lockwire diagram from the tech manual.

POST START AND STOP INSPECTIONS OF GTMS AND GTGS

By LCDR Del Bena

A common problem on gas turbine ships is the watchstanders' effectiveness conducting post start and shutdown inspections of GTMs and GTGs. So, what procedure should be used? A very good question! There is no EOP procedure like GTMI or GTGI that applies here. It has been observed that PSMs and EROs were conducting these important inspections differently, many of which were incomplete or cursory. Should a complete GTMI or GTGI be conducted prior to starting or stopping of a gas turbine engine? NO, but each ship should have some checklist or procedure for the ERO or PSM to use as they conduct their inspections. A sample of what should be looked at during an FFG- 7 GTM post start/shutdown inspection might look like:

GTE PRESTART/ POSTSTART INSPECTION

1. VISUALLY INSPECT GTE THROUGH THE INSPECTION WINDOW BOTH INBOARD AND OUTBOARD (LOOKING FOR F/O OR L/O LEAKS, FUEL WETTING, FOD, SAFETY CHAINS BEING ATTACHED AND BURNT OUT LIGHTS)
2. VISUALLY CHECK UNDER GTM FOR F/O, L/O LEAKS, LOCKWIRE ON CANNON PLUGS, HOKE VALVE AND XDUCER ALIGNMENT ON BOTH INBOARD AND OUTBOARD SIDES OF GTE.
3. CHECK LOSCA TANK LEVEL (19 GALLONS) –OIL SHOULD BE VISIBLE IN THE LOWER SIGHT GLASS
4. CHECK LOP FOR ALARMS AND CONDUCT A LAMP TEST OF ALL SECTIONS
5. VERIFY GTE L/O SYSTEM IS ALIGNED
6. VERIFY ENCLOSURE FAN IS IN REMOTE
7. VERIFY ENCLOSURE HEATER IS OFF
8. INSPECT INTAKE, COOLING AIR AND EXHAUST BOOTS FOR CRACKS, HOLES ETC.
9. VERIFY START AIR SYSTEM ALIGNMENT
10. ENSURE MOTORING CONTROL AIR VALVE IS CLOSED. (CA-V20)

Additionally, the watchstanders need to have a flashlight to look under the modules. Developing and posting a procedure would certainly help them make sure they don't miss anything. Toward this end, I have seen ships place a laminated copy of their checklist/procedure on the backside of the PSM's clipboard for ready use during inspections and rounds of the space.

DAMAGE CONTROL/ FIREFIGHTING

FIREFIGHTING

FIRE FIGHTER'S ENSEMBLES WITH FIRE PROTECTIVE GEAR (FPG)

By LCDR Del Bena

Ref: (a) CNSL 261832ZSEP00, Damage Control Advisory Two Three

Reference (a) provides information and stock numbers for a new phased replacement fire fighter's coverall with protective gear (FPG). The FPG is a single piece coverall certified to NFPA standards for protective ensemble for structural fire fighting, 1997 edition. Improved features include a removable liner, longer leg zipper, knee/shoulder padding and enlarged thumb hole.

DAMAGE CONTROL

OCENCO EEBDs

By LCDR Del Bena

Ref: (a) COMNAVSURFLANT NORFOLK VA 171915ZSEP99
(b) COMNAVSURFLANT NORFOLK VA 081820ZMAR00
(c) CINCLANTFLTINST 3541.1G

There continue to be problems with the distribution of the new OCENCO EEBDs onboard ships. Reference (a) states the Type Commander's policies and procedures for implementation of OCENCO EEBDs. This message includes the desired changeout procedure and the submission of a current EEBD inventory message. Reference (b) reiterated the policies and procedures associated with the OCENCO EEBD changeout and provided guidance on the disposal of SCOTT EEBDs. If you don't have these messages, we encourage you to contact your Material Officer.

Some of the problems that have been encountered by ships include an insufficient number of OCENCO EEBDs onboard, old SCOTT EEBD's still retained onboard, no training OCENCO EEBD's onboard, or no OCENCO training video or maintenance documentation available for use onboard. In a couple of instances, ships were using actual SCOTT EEBDs for training vice the SCOTT EEBD Trainers and then not maintaining the minimum required inventory onboard. This then threw off their actual onboard inventory and when they transmitted that EEBD inventory message to CNSL as required by reference (a), they found themselves short when the SCOTTs were replaced with OCENCO EEBDs on a one for one changeout.

Another problem identified and tracked down was that ships had not received any training OCENCO EEBDs or the new training film. As a result, with no training allowance for using the actual EEBD, training had not been fully accomplished. The shipboard allowance of OCENCO training EEBDs was addressed in our last newsletter. Most of you get 3 trainers per ship, with amphibious ships getting 25 and mine warfare ships one each. If you didn't get, or still don't have your training allowance of OCENCO training EEBDs, contact your ISIC Material Officer, who will then contact CNSL and arrange for shipment. The Material Officer can also coordinate with COMNAVSURFALNT to get you a copy of the OCENCO tech manual (we can also provide a copy on a limited basis). The latest copy of the OCENCO training video is revision 2. This video also covers some basic maintenance procedures. If you do not have a copy of this valuable training aid, you can request a copy from Ms. Cathy Carpenter at the Naval Coastal Systems Center in Panama City, FL at (Comm) 850- 234-4653 or DSN 436-4653.

Of equal importance are training and the level of knowledge associated with EEBDs, either OCENCO or SCOTT. On the deckplates, sailors continue to demonstrate a weak level of knowledge on the proper donning and use of EEBDs. The EEBD was designed to provide a safe air source for emergency egress from toxic atmospheres, such as fires. As a reminder, reference (c) discusses the training requirements associated with damage control items such as EEBDs and OBA/SCBAs. This training is to include the donning and activation of a training EEBD within 96 hours of an individual reporting onboard and semi-annually thereafter. Hey XO, how robust is your training program in this regard?

NAVY VARI-NOZZLE

By LCDR Del Bena

Ref: (a) NSTM 555 Rev 7 para 4.8.4.1

Navy vari-nozzles in the main spaces and on the DC decks are not always set in the recommended position per reference (a). Reference (a) states that the “the navy vari-nozzle should be stowed with the bail handle in the closed position and the nozzle set to the narrow angle (30 degree pattern) fog”, commonly known as the narrow "V". This is the preferred method of stowage for the navy vari-nozzle.

REPAIR PARTY MANUAL

By LCDR Del Bena

Ref: (a) COMNAVSURFLANTINST 3541.1C
(b) COMNAVSURFLANT NORFOLK VA 140127Z AUG 92

What changes do you have incorporated in your Repair Party Manual, reference (a)? Did you know that there is at least one change out there? Often ships are using just the basic instruction without any changes incorporated. The COMNAVSURFLANT Instructions CD-ROM does not include Change One, and ACNs 2/1 and 3/1. Change One to this instruction was promulgated by naval message (reference (b)) and is still effective.

COMNAVSURFLANT is in the final stages of drafting a new Repair Party Manual that should be issued later this year. For further information, a copy of Change One or the ACNs, you can contact DCCS (SW) Coleman (CNSL N811B) at DSN 836-3095.

POSTED OPERATING INSTRUCTIONS FOR EDUCTORS

By LT Chuck Smith

Ref: (a) GENSPECS Section 529h
(b) NSTM 079 Vol II, Para 29.7.1

Many ships no longer have the required instructions and warning placards posted at eductors, local and remote eductor operating stations. Here is a summary of the required placards taken from reference (a).

1. All eductor suction cutout valves shall be fitted with an inscription reading:

CAUTION
DO NOT OPEN UNTIL VACUUM IS INDICATED ON GAGE

2. All eductor actuating water cutout valves shall be fitted with a label plate with an inscription reading:

CAUTION
DO NOT OPEN UNTIL OVERBOARD DISCHARGE VALVE IS OPEN

3. An operating instruction placard showing the schematic diagram of the eductor piping and describing the step-by-step procedures of operating and securing the eductor shall be posted at each local and remote eductor operating station.

4. Reference (b) requires that all accesses to confined spaces with eductors or eductor bilge suctions have signs posted warning of the potential asphyxiation hazards, with appropriate instructions regarding the use of ventilation systems while the eductor is in operation.

These are important safety instructions because improper eductor alignment can cause significant flooding. It is important to have these instructions posted since not all ships currently have EOSS coverage for their main and secondary drainage systems or the applicable EOSS may not be available to the watchstander in an emergency (particularly at remote operating stations). Additionally, with the increase in inport duty sections and resulting decrease in the number of folks in a duty section, it is quite likely that non-engineering personnel will be required to operate an eductor in an emergency. They often have the best of intentions but are often not familiar with the use of EOSS further necessitating the criticality of having these safety/warning placards posted.

SCBAs

By LT Brian A. Minard

Ref: (a) MIP 5519/016-A9

More and more ships are being converted from OBAs to SCBAs or they are being outfitted with them during construction. The comments we have heard from those of you with SCBAs installed, has been very positive, and like you, our learning curve on this item has been steep.

Some common problems have been:

- Dead batteries in the voice amplifiers.
- SCBAs stored without turning off the air from the cylinder.
- The R-1 and R-2 MRC checks not being accomplished after each use.
- SCBA and spare cylinders are stored for use with bottle pressures below 4000 PSI.
- EGLs are not filled out with cylinder location, date of manufacture, serial number, and date of last hydrostatic test.
- The 1st and 2nd stage regulator test log has not been established.

A much more serious problem is that bottles are becoming gouged when being placed back into the horizontal stowage lockers. The metal fasteners that attach the retaining clips in these lockers have created cuts or gouges deeper than .005 inches in the fiberglass coating of the bottle. When the bottle has sustained a gouge or cut in its surface greater than .005 inches deep, the bottle is no longer serviceable and must be replaced. For one ship, this meant changing out almost all of their bottles at a significant cost. MRC R-2 describes the inspection criteria for checking the surface of each bottle.

The approval to utilize the SCBA aboard our ships has led to new challenges and issues in maintaining them. If you have SCBAs installed, it would be worth your effort to train all hands not only in the operation of the SCBA (a fleet requirement if installed vice OBAs!) but in the associated PMS that goes with them. If our folks are aware of the maintenance requirements, they can be of invaluable assistance in maintaining your new asset.

OBA PMS

By LCDR Del Bena

Ref: (a) MRC 6641/Q-8R, R-8
(b) MRC 6641/R-11
(c) MRC 6641/M-14R
(d) MRC 6641/A-13R
(e) MRC 6641/S-3R

It is crucial that Damage Controlmen assigned to each Repair Locker complete the required situational PMS checks prior to restowing the OBAs (reference (a) requires each OBA to be inspected/tested and visually inspected/disinfect facepieces after each use). During the basic through the advanced training phases, OBAs see a lot of use, and are subjected to a lot of wear and tear. There is no need for our Sailors to be needlessly subjected to potential hazard in a fire because of damaged or inoperative OBA.

Additionally, there are other pieces of damage control equipment that have situational PMS checks associated with them such as:

- The Firefighter Ensemble (reference (b) – clean and inspect the FFE after each use)
- Damage control headlights and flashlights (reference (c) – conduct operational tests monthly/weekly based upon ambient temperature)
- OBA canisters (reference (d) – inspect canisters), and; the Fire Finder (reference (e) – test operate and inventory).

If the junior Damage Controlman you have assigned to the Repair Lockers lacks sufficient experience or knowledge in the OBA or other damage control equipment, engage your supervisors and DCTT to address the issue or request an LTT from your regional ATG to help address the issues.

THE SEED LOG

By CAPT D.G. MacCrea

What is a SEED Log? Most importantly it is a management tool to track where a SEED is and its current status. It can have many different forms. The key is to have one and use it. Why? Because SEEDs are an extremely important piece of Personnel Protective Equipment used by our watchstanders. They were developed and provided for our use aboard ship at the hard spent cost of several lives and we owe it to our shipmates to do whatever we can to ensure their safety.

It is recommended that the SEED Log be maintained in CCS or the Log Room, wherever the SEEDs are kept. The log should have some means of tracking which engineer currently has which SEED and whether it is serviceable or not. It should also include a copy of MRC 6641/017 S-1R (every ship has this MIP/MRC). This MRC is the issue/receipt inspection criteria for SEEDs and the check must be accomplished every time we pull a SEED out to wear into the spaces!

To help ships develop a viable and effective SEED Log a sample log page is attached as an Addendum. We hope you use it, to develop or update a log to ensure it meets your needs.

DAMAGE CONTROL READINESS ADVISORIES (DCRA)

By LCDR Del Bena

Damage Control Readiness Advisories are a DCA turnover item (see CNSL 061450ZDEC99). To make sure your DCRA Binder is current all you have to do is:

- Log onto the COMNAVSURFLANT web page at www.cnsl.spear.navy.mil
- Click on directorates
- Scroll down to "N8 Requirements, Readiness & Assessments" and click on "DCRA Messages"
- Click on "file name" to open message.

SCOTT SCBA ANTI-FOG KIT

By LCDR Del Bena

Ref: (a) NAVSURFWARCEN COASTSYSTA PANAMA CITY FL 211925Z Sep 00

During a recent damage control conference, I was afforded the opportunity to see the new Scott SCBA anti-fog kit in action and it was outstanding. What is this new kit about? It's an auxiliary exhalation valve assembly kit (P/N 29513-01) and it has been developed to help reduce fogging within the Scott AV-2000 full facepiece. These are the facepieces supplied with the Scott 4.5 airpak SCBA during OBA/SCBA conversion. Reference (a) provides specific data on the point of contact as well as authorization for use of the kit.

The existence of the auxiliary exhalation valve can be verified by removing the E-Z flow regulator from the facepiece and looking into the facepiece exhalation port. You should see a black disc with three ¼ inch diameter holes. If you see one large hole (1.5-inch diameter) then the facepiece does not have the kit installed. Our Sailors deserve to have the best equipment, especially when its use can mean life or death in the case of a large fire. This kit is another example of providing the best tools available to our crews.

HYDROGEN SULFIDE TESTING

By LCDR Del Bena

Ref: (a) NSTM 555 Vol 1 Rev 7 dated 7/99
(b) COMNAVSURFLANTINST 3541.1C, Standard Repair Party Manual for Naval Surface Force

Many Main Space Fire Doctrines do not address testing for hydrogen sulfide during atmospheric testing. Per reference (a) section 10.3.11.2 "if AFFF has been discharged, a test for Hydrogen Sulfide should be conducted". Reference (b) discusses at least three occasions

when AFFF should be used to combat a class bravo fire.

ADDENDUM A

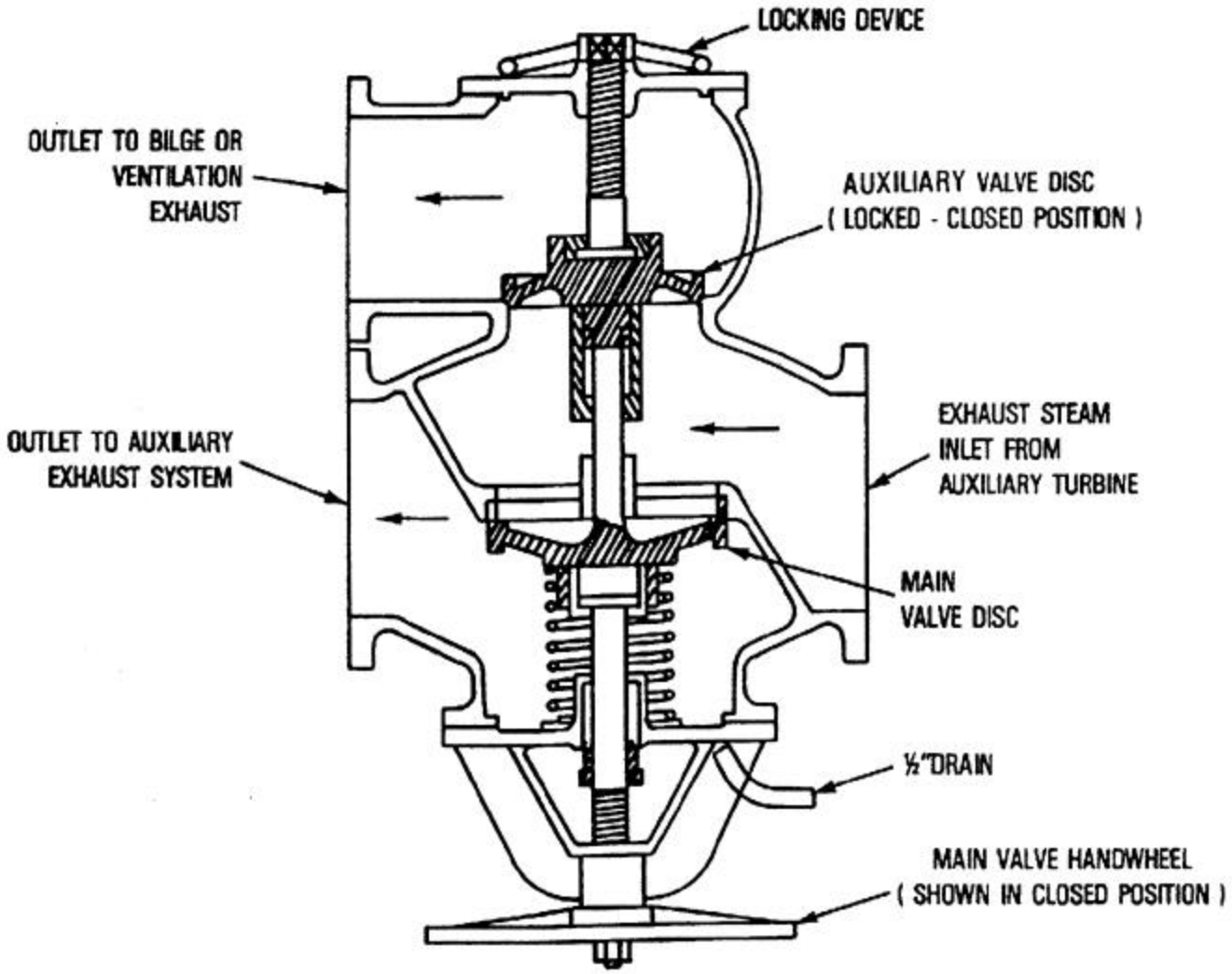

Figure 505-9-7. Combined Exhaust and Relief Valve (Typical).

ADDENDUM B

SEED LOG

SEED NR _____ (MIP 6641/S-1R)

Date	Name	Time Out	Time In	S-1R Sat/unsat	Initials	Comments

ADDENDUM C

FFG 7 Class SSDG Jacket Water System 3-Way Temperature Valve Information and Alignment Procedure

1. System Components: The four main components which form the basis for the engine jacket water and waste heat water temperature regulating system are: (1) the waste heat heat exchanger (WHHE) temperature regulating pilot valve, RQ-2N; (2) the JW temperature regulating pilot valve, RTP-2N; (3) the JW temperature regulating valve assembly (3-way valve), DDVTN-22A4A2SL; and (4) the thermostatic valve positioner, P/N 62378 which is physically attached to item (3).

2. System Description: The WHHE temperature regulating pilot valve, RQ-2N, senses the temperature of the waste heat water as it leaves the WHHE. It sends a control signal varying from 15 psi to 3 psi to the JW temperature regulating pilot valve, RTP-2N, which under most circumstances passes this signal through unchanged to the underside of the 3-way temperature regulating valve. The 3-way valve proportions the amount of engine JW flowing to both the waste heat heat exchanger and the JW cooler to maintain desired temperatures in the engine and the waste heat system regardless of either engine or waste heat system load See figure 1 for system schematic.

3. System Operation: System temperatures are controlled by a 3-way valve which proportions the amount of JW flowing through the WHHE and the JW heat exchanger at all times in order to maintain the temperature of the waste heat water leaving the WHHE within the range of 171 to 178.5 deg F. with a corresponding engine JW outlet temperature range of 188 to 194 deg F.

The temperature of the waste heat water leaving the WHHE is sensed by the WHHE temperature regulating pilot valve which has a supply air pressure of 20-22 psi and a control air output pressure inversely proportional to the sensed temperature. This is a reverse acting valve in that the output pressure decreases from the 15 psi to 3 psi as he sensed temperature increases from 171 to 178.5 deg F.

The control air output signal from the WHHE temperature regulating pilot valve is sent to the JW temperature regulating pilot valve where it becomes the input signal to this pilot valve which is sensing the temperature of the JW leaving the engine. This pilot valve is also reverse acting but does not become active until engine JW outlet temperature reaches 191 deg F. At any engine JW outlet temperature below 191 deg F, the air signal from the WHHE temperature regulating pilot valve passes through the JW temperature regulating pilot valve unchanged.

From the previous description, it should be seen that the lower the two outputs from the two pilot valves in the system will determine what pressure is sent to the thermostatic valve positioner (item 4) attached to the 3-way valve. The thermostatic valve positioner, like the WHHE temperature regulating pilot valve, is supplied with air pressure in the range of 20-22 psi and has an output pressure equivalent to the incoming signal from the JW temperature regulating pilot valve.

The output signal from the thermostatic valve positioner goes to the underside of the 3-way diaphragm. A 15 psi air signal to the 3-way valve forces the valve to the fully up position directing 100% of the JW flow to the WHHE. A 3 psi signal allows the actuator spring to force the valve to the fully down position directing 100% of the JW flow to the JW heat exchanger. A loss of control air pressure will cause the 3-way valve to “fail-safe” in that the valve will be forced downward directing 100% of the JW flow to the JW heat exchanger.

4. Initial System Check-out: Prior to making adjustments to the system, there are some quick checks which should be made:

A. Supply air pressure to the WHHE temperature regulating pilot valve is proper (20-22 psi)

B. Supply air pressure to the thermostatic valve positioner is proper (20-22 psi)
C. Manual handwheel on the 3-way valve is turned fully clockwise (system in the Automatic mode)
D. Inlet control air pressure of the JW temperature regulating pilot valve is equal To the outlet pressure of the WHE temperature regulating pilot valve.
E. Pilot levers of RTP-2N and RQ-2N have proper clearance of 5/32" set at room temperature (approximately 75 deg F)

5. Waste heat temperature regulating pilot valve – System test and adjustment procedures:
   A. "Initial checks" in paragraph 4 are satisfactory.
   B. With a pencil, mark the current position of the JW pilot valve (RTP-2N) adjusting knob fully clockwise. This causes the pilot to always transmit maximum pressure as received from the WH pilot valve. Lightly turn the proportional band adjusting knob on back of RTP-2N fully clockwise to seat it and then open it 1/6 of a turn.
   C. With a pencil, mark the current position of the WH pilot (RQ-2N) adjusting knob to use as a reference pint but leave the knob in its current position.
   D. Start engine as per normal EOSS procedures and gradually load the generator set to about 500 kw while at the same time monitoring the temperature of the WH water leaving the WHHE and the output air signal of the WH temperature regulating pilot valve (RQ-2N).

Note that the WH system does not need to be in operation but the system must be filled to the point where the pilot is covered. If necessary, the WH system should be run for a short time prior to starting the engine to cool the system down below the sensed temperature of 171 deg F which is the point at which the WH temperature pilot becomes active.

   E. If the WH pilot starts to decrease it output signal below 15 psi prior to the WH outlet temperature reaching 171 deg F, turn the adjusting knob on the front cover one to two graduations clockwise.
   F. If WH outlet temperature exceeds 171 deg F and there is no change in the outlet Signal from the WH pilot, turn the knob one to two graduations counter-clockwise.

The output air signal should follow that shown in figure 2. Adjust the knob on the front cover until the best match with figure 2 is obtained, Erase the old pencil mark and then mark the new position of the knob with a felt-tip pen.

This completes the adjustment of the waste heat temperature regulating pilot valve, (RQ-2N). Shut down the engine as per normal EOSS procedures.

6. Jacket water temperature regulating pilot valve – System test and adjustment procedure:

Adjustment of the JW temperature regulating pilot valve is performed in a similar manner to that of the WH pilot valve. With the engine shut down, turn the WH pilot adjusting knob fully clockwise and return the JW pilot valve adjusting knob to the position marked in step 5b.

   A. Start the engine as per normal EOSS procedures and gradually increase the load of the generator set to 500 kw while monitoring engine JW outlet temperature and the outlet air signal from the JW temperature regulating pilot valve.
   B. Output pressure of the WH pilot valve and input pressure to the JW pilot valve valve should remain at 15 psi because by turning the WH pilot valve adjusting knob fully clockwise, the sensing temperature of the WH pilot valve has been raised above that which is realized under any circumstances.
   C. Compare engine JW outlet temperature and output pressure of the JW temperature pilot valve to those shown in figure 2.

As engine JW outlet temperature goes above 191 deg F, the output pressure of the JW pilot valve should decrease below 15 psi which will cause the 3-way valve to move downward and divert a portion of the JW flow to the JW cooler. Engine JW outlet temperature should reach a stable value above 191deg F.

D. If the JW pilot starts to decrease its output signal below 15 psi prior to the JW outlet temperature reaching 191 deg F, turn the adjusting knob on the front cover one graduation clockwise.
E. If JW outlet temperature exceeds 191 deg F, and there is no change in outlet signal from the JW pilot, turn the knob two graduations counter-clockwise.

The output air signal should follow that shown in figure 2 for the JW pilot output pressure. Adjust the knob on the front cover until the best match with figure 2 is obtained, erase the old pencil mark and then mark the new position of the knob with the felt tip pen.

7. Test of the complete system:

Turn the adjusting knob on the WH pilot valve to the mark on the scale at the conclusion of the WH pilot tests in paragraph 5.

Gradually increase the load on the generator set to 1000 kw or the highest valve at which can be maintained by using ship's load and operate the waste heat system. After system temperatures have stabilized, waste heat outlet temperature should be in the range of 171 to 178.5 deg F, and engine jacket water outlet temperature should be 188 to 194 deg F.

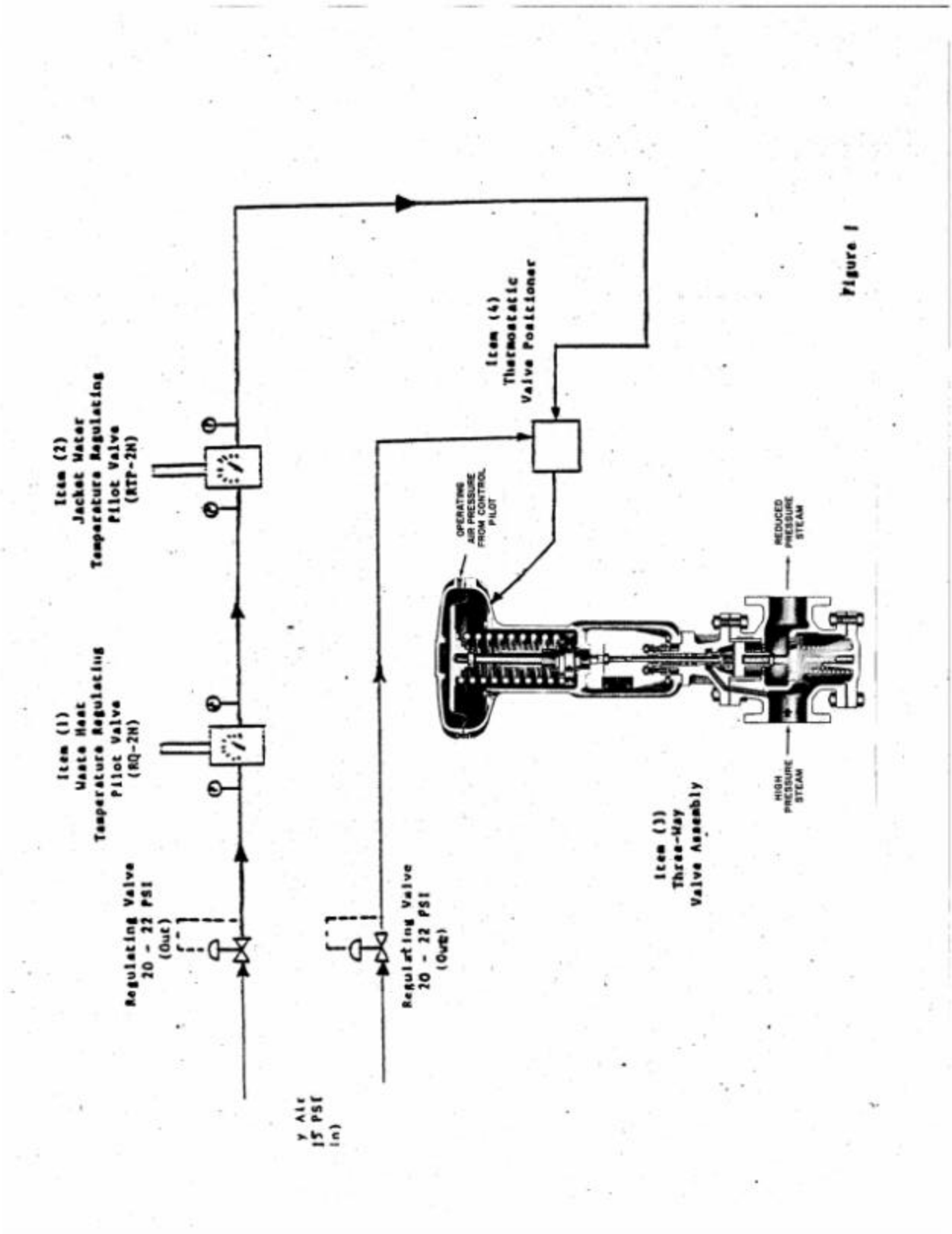
Item (1)
Waste Heat
Temperature Regulating
Pilot Valve
(RQ-2N)
Item (2)
Jacket Water
Temperature Regulating
Pilot Valve
(RTP-2N)
Item (4)
Thermostatic
Valve Positioner
Item (3)
Three-Way
Valve Assembly
Regulating Valve
20 - 22 PSI
(Out)
Regulating Valve
20 - 22 PSI
(Out)
Y Air
15 PSI
in)
OPERATING
AIR PRESSURE
FROM CONTROL
PILOT
REDUCED
PRESSURE
STEAM
HIGH
PRESSURE
STEAM

Figure 1

ADDENDUM D

DDG 51 GTMI AND GTGI ADDENDUM

(***Editor's Note***: *These procedures, although specifically written for DDG 51 class ships, can easily be tailored to other gas turbine platforms.*)

Gas Turbine Module Inspection (GTMI):

Enter the engine enclosure in accordance with EOSS procedure GTMI; ensure all applicable safety precautions are followed while conducting the evolution. Follow all applicable steps pertaining to the execution of GTMI listed in EOP GTMI, and utilize the engine inspection checklist provided below.

INSPECT INLET PLENUM

- Inspect the bell mouth and center body for damage, inspect for obvious chipped paint, check-securing RTV on safety wire located on the center body mounting hardware.

- Inspect the Inlet Guide Vanes for leading and trailing edges for damage.

- Inspect the First Stage Blade Mid-Span Dampers for wear.

- Inspect Permanent FOD Screen, checking for wire damage, cuts tears and separation and inspect epoxy bonding for cracks.

- Inspect Inlet Plenum Lights, ensuring to inspect for safety wire on electrical connectors, and the installation of safety wire on light globes, check the globes for security of mounting hardware.

- Inspect the Barrier Wall for loose or missing hardware. Inspect the 12 o'clock split line for the installation of RTV across the top of the centerline

- Inspect the integrity of the module drains, specifically looking for dirt contamination in the drain system. Inspect all painted surfaces within the Inlet Plenum area; inspect for rust and corrosion.

- Inspect perforated sheet metal rivets/weld for integrity and security.

- Close out the Inlet Plenum prior to exiting; ensure to follow EOP GTMI prior to securing the access cover mounting hardware (for the proper torque specifications).

COMPRESSOR FRONT FRAME

- Inspect for oil accumulation at the top of Transfer Gear Box (seal assembly) located below Compressor Front Frame at the 6 o'clock position.

- Inspect the Front Frame flange mounting hardware for tightness and integrity.

- Inspect the Compressor Inlet Temperature Sensor for damage or leakage.

- Check the Ignition Exciter for damage and integrity, ensure safety wire is properly installed and existing chaff guards are properly positioned and are in good repair.

- Check all clamps and brackets for cracks and looseness.

- Inspect Water Wash and fire jacket hoses for integrity and quick disconnect fittings on module deck for signs of leakage.

COMPRESSOR

- Inspect upper and lower Compressor Case for cleanliness, formation of salt and corrosion.

- Inspect mounting clamps and brackets for loose fasteners and cracks.

- Inspect sump vent tubing for integrity and signs of leakage.

- Inspect Flange Mounting Hardware for tightness and integrity.

- Inspect for correct installation of applicable safety wire.

VARIABLE STATOR ACTUATION SYSTEM

- Inspect actuator to mounting bracket security.

- Inspect Actuator Rod End Bearing for wear.

- Inspect Bearings in Master Lever for wear, looseness or binding.

- Inspect Turnbuckle Rod End Bearings for wear and security.

- Inspect Actuator Master Lever Mount Bearings for looseness (aft pivot point).

- Inspect all accessible VSV Actuation levers for binding, bends and damage, inspect VSV Bushings for excessive looseness.

- Inspect VSV Actuator Master Lever Mount Spacer for wear or looseness (attachment to the Compressor Rear Frame).

- Inspect the VSV Feedback cable for binding, bends, and looseness.

- Inspect for correct installation of applicable safety wire.

COMPRESSOR REAR FRAME

- Inspect Flange Mounting Hardware for tightness and integrity.

- Inspect mounting clamps and brackets for loose fasteners and cracks.

- Inspect all tubing for integrity and signs of leakage.

- Inspect vent ports for evidence of leakage.

- Inspect Fuel Nozzle Mounting hardware for looseness and security.

- Inspect combustor alignment pins for security.

- Inspect Ignition Leads and Igniters for integrity and signs of wear (chaffing).

- Inspect Vibration Accelerometer for security.

- Inspect Bleed Air Ports for integrity and signs of leakage. Inspect 16th stage bleed air manifold for indication of cracks, splits or dents, inspect the integrity of the 16th stage bleed valve.

- Inspect for correct installation of applicable safety wire.

TURBINE MID FRAME

- Inspect Flange Mounting Hardware for tightness and integrity.

- Inspect all tubing for integrity and signs of leakage.

- Inspect Thermocouple Harness for security and integrity.

- Inspect PT5.4 (Power Turbine Inlet Pressure) manifold for security and integrity.

- Inspect mounting clamps and brackets for loose fasteners and cracks.

- Inspect for correct installation of applicable safety wire.

POWER TURBINE

- Inspect all tubing for integrity and signs of leakage.

- Inspect all elements for signs of cracking inspect the power turbine case for signs of warping and thermal stress.

- Inspect Flange Mounting Hardware and Vane Mounting Hardware for tightness and integrity.

- Inspect for correct installation of applicable safety wire.

TURBINE REAR FRAME

- Inspect all tubing for integrity and signs of leakage.

- Inspect elements for signs of cracking.

- Inspect Engine Mounts for security and looseness (quantity of 11).

- Inspect mounting clamps and brackets for loose fasteners and cracks.

- Inspect Vibration Accelerometer for security.

- Inspect Heat Blanket for security and integrity (if applicable).

MODULE GENERAL

- Inspect Enclosure Heater for condition and integrity.

- Inspect Heat Sensors for integrity and security.

- Inspect Vent Damper Actuation System for condition and integrity, inspect damper louvers for bends and damage.

- Inspect Flame Detectors for condition and security.

- Inspect T2 (Inlet Temperature Sensor) and Icing Detection Sensor for integrity and security of mounting hardware.

- Inspect Module Lighting ensuring to inspect for safety wire on electrical connectors, and the installation of safety wire on light globes, check the globes foe security of mounting hardware.

- Inspect Air Oil Separator Vent Boot for signs of integrity, and leakage.

- Inspect all components mounted on the Accessory Gear Box (Fuel Pump, Fuel Control, Starter, Start air tube, Start Air Regulating Valve, Lube Supply and Scavenge Pump, the Air Oil Separator) inspect for security, integrity and signs of leakage.

- Inspect all accessory component hoses for integrity of Fire Sleeves and any indication of collapse, bends, kinks wetting or leakage at fitting connections (B nuts).

- Inspect all tubes, hoses and electrical leads for indication of rubbing or chaffing.

- Inspect for correct installation of applicable safety wire.

MODULE EXTERIOR

- Inspect Shaft Shroud (mounted on the enclosure rear panel), Flexible Member for rips and tears, and for separation of bonded joints (overlap).

- Inspect Module Expansion Joints, Primary Air Inlet, Secondary Air Inlet, and Exhaust Uptake, flexible members for rips and tears, inspect the bonded joints for separation (corners and overlap).

- Inspect the Module Exterior Bulkhead surfaces for indications of rust, and deterioration.

- Inspect Module Windows for loose gaskets, moisture collection behind windows, discoloration and for breakage or cracking. When the cooling fan is running during operations inspect the windows for air leakage).

- Inspect Shock Mount flexible boot for cuts rips or tears. (Quantity of 32)

- Inspect Switches, enclosure light switches (side hatch and plenum inspection window) and fire alarm push-button for loose or missing mounting hardware, dents, and cracks in the housing body. Ensure the electrical connectors are properly secured and correctly lock wired.

- Inspect all Pressure Transducers and Signal Conditioners mounted on the underside of the base penetration plate for security, loose mounting hardware, proper installation of bonding grounding straps (if applicable).

- Inspect instrumentation valves for security, and leakage
also inspect the differential pressure gages for being out of calibration or signs of any obvious mechanical damage.

- Inspect all accessible Vibration Damping Tiles (underside of module base) for looseness, damage or missing pieces.

- Inspect Module door and Top Hatch Assemblies for damaged gaskets (inner seals and outer seals). Inspect top hatch torsion bar for security and mechanical defects as cracks, binding, and bends.

- Inspect for correct installation of applicable safety wire.

LUBE OIL STORAGE and CONDITIONING ASSEMBLY (LS&CA) and components.

- Inspect the Tank and Frame Assembly for cracks/splits in piping.

- Inspect the Oil Tank for leakage at the sight glasses.

- Inspect the assembly electrical cables for integrity and mounting hardware for security.

- Inspect Tubing Clamps and Heat Exchanger mounting hardware for looseness and security.

- Inspect the Tank Lube Oil Switch for flange leakage as well as security of the mounting hardware, ensure electrical connector is tight.

- Inspect the Heat Exchanger/Oil Cooler for cracks and splits, inspect end bell flange joints for leakage.

- Inspect the Duplex Oil Filter for damage, security of mounting hardware and leakage.

- Inspect Differential Pressure Transducer and Gage for damage, out of calibration or broken glass.

- Inspect Temperature Sensor for damage and security.

- Inspect for correct installation of applicable safety wire.

Gas Turbine Generator Inspection (GTGI)

Enter the engine enclosure IAW EOSS CP. EOP GTGI; ensure all applicable safety precautions are followed while conducting evolution. Follow all applicable steps pertaining to the execution of GTGI listed in EOSS CP. EOP GTGI, and utilize the engine inspection checklist listed below.

- Inspect the intake inspection covers (located in the reduction gear compartment) for cracks and deterioration. Inspect the engine intake for signs of salt and dirt accumulation, ensuring to inspect the struts and first stage vanes and blades.

- Inspect the attaching V-Band clamp for security and cracks.

- Inspect the flexible plenum seal for signs of deterioration cracks and rips;

- Inspect all associated mounting hardware ensure none are loose or missing

AIR INLET HOUSING

- Inspect Air Inlet Housing attaching hardware, ensure there are no loose or missing fasteners or broken clamps.

- Inspect associated flexible hoses for kinks, bends, collapse or twisting.

- Inspect the integrity of the hose connections for leakage. (Ref. Para. 6-66 and Table 6-28 S9311-C6-MMO-030 Corrective Maintenance Manual.)

- Inspect the integrity of the engines CIT sensor, cannon plug should be tight and lock wired with .020 dia. safety wire. (Ref. Para. 6-44 through 6-49 S9311-C6-MMO-030 Corrective Maintenance Manual.)

- Inspect the integrity of the engine oil breather. Inspect vent piping (in overhead of the module) running aft to the exhaust for looseness and oil leakage.

- Inspect for the correct installation and application of safety wire. (Ref. Paragraph 6-44 through 6-9 and Figure 6-4 Safety Wire Installation S9311-C6-MMO-030 Corrective Maintenance Manual.)

COMPRESSOR CASE

- Inspect the engine compressor case Split lines Case and Vane locknuts for loose or missing hardware, inspect case for indications of stress cracks and corrosion.

- Inspect associated air flexible hoses for kinks, bends, collapse or twisting. Inspect all hoses for indication of rubbing or chaffing. Inspect hose clamps for tightness ensuring that no danger of contact rubbing of the hose assembly. (Ref. Paragraph 6-66 and Table 6-28 S9311-C6-MMO-030

Corrective Maintenance Manual.)

- Inspect the integrity of 5th and 10th bleed air valves for security and missing fasteners inspect the bleed valve blast screens for cracks and obvious signs of deterioration. Inspect the bleed valves screens for cuts and tears. Inspect the actual position of the 5th and 10th stage bleed valves, valves should be in the full open position.

- Inspect the Liquid Fuel Valve bracket mounting hardware for loose or missing fasteners, inspect the fuel valve for signs of leakage and associated hoses for kinks, bends, collapse or twisting. Inspect all hoses for indication of rubbing or chaffing. Inspect hose clamps for tightness ensuring that no danger of contact rubbing of the hose assembly. (Ref. Paragraph 6-66 and Table 6-28 S9311-C6-MMO-030 Corrective Maintenance Manual.)

- Inspect for the correct installation and application of safety wire. (Ref. Paragraph 6-44 through 6-9 and Figure 6-4 Safety Wire Installation S9311-C6-MMO-030 Corrective Maintenance Manual.)

DIFFUSER

- Inspect the Diffuser case for indications of stress cracks and corrosion.

- Inspect the diffuser split lines for loose or missing fasteners, inspect the diffuser mounting brackets for indications of stress distortion and cracks (ensure vertical and horizontal turnbuckles locking nuts are tight).

- Inspect the engine settlement gage ensure tool is properly mounted and mounting hardware is secure.

- Inspect the integrity of the fuel nozzle mounting fasteners for loose or missing hardware. Inspect nozzle gaskets for indications of gas leakage.

- Inspect the fuel manifold for signs of fuel leakage and hoses for indication of contact rubbing resulting in chaffing.

- Inspect the 14th Stage Bleed Air Manifold for indications of stress cracks, ensure to carefully inspect expansion bellows (3 ea.).

- Inspect 14th stage diffuser bleed valves for security and missing hardware, inspect all V-Band clamps for cracks and missing hardware ensure to carefully inspect for gas leakage at flanges.

- Inspect all Ps3 connections on the diffuser inspect for missing hardware and loose fasteners.

- Inspect hose connections and mounting clamps for tightness and missing hardware.

- Inspect the engine lifting fixture mounted at 12 o'clock position on the diffuser for signs of cracking or deterioration.

COMBUSTOR

- Inspect Combustor Outer Case for signs of warping and obvious thermal stress.

- Inspect the Combustor split-lines and mounting flanges (diffuser and turbine inlet vane case) attaching hardware and fasteners for loose or missing pieces and for indications of gas leakage.

- Inspect Combustor liner supports (4ea.) and igniters (2ea.) for loose or missing mounting hardware.

- Inspect supports for indications of gas leakage.

- Inspect Lower Burner Drain Valve Assemblies for evidence of fuel leakage and security of mounting hardware.

- Inspect the burner drain valve flexible hose for chaffing, broken wire braiding and damage.

- Inspect (CDP) Compressor Discharge Air Balance Piston Air Tube and the Oil Supply Tube for the turbine rear bearing assembly for cracks bends security of clamps and mounting hardware. Inspect both units for indication of leakage.

- Inspect for the correct installation and application of safety wire. (Ref. Paragraph 6-44 through 6-9 and Figure 6-4 Safety Wire Installation S9311-C6-MMO-030 Corrective Maintenance Manual.)

TURBINE (Power Section)

- Inspect the exterior of the Turbine Inlet Vane Case, Turbine and Turbine Rear Bearing Support for signs of corrosion, warping and obvious thermal stress.

- Inspect mounting flanges for security of mounting hardware and fasteners for corrosion, and loose or missing pieces.

- Inspect the integrity of the Thermocouple Wiring Harness for indications of chaffing or fraying. Inspect all Thermocouple Leads for security and cracking, inspect all mounting fasteners for loose or missing pieces.

- Inspect the integrity of the thermocouple junction-mounting block for cracks and security of all mounting hardware.

- Inspect Vibration Transducer integrity and security, inspect transducer mount for cracks and corrosion.

- Inspect the mounting hardware of the Thermocouple Boss Plugs in the inlet vane casing for indication of cracks and corrosion.

- Inspect the Power Section elements for thermal stress cracks.

- Inspect for the correct installation and application of safety wire. (Ref. Paragraph 6-44 through 6-9 and Figure 6-4 Safety Wire Installation S9311-C6-MMO-030 Corrective Maintenance Manual.)

ACCESSORY GEAR BOX

- Inspect all components on the Accessory Gear Box (located beneath the air inlet housing at the 6 o'clock position), EHGA Electro Hydraulic Governor Actuator, including mechanical linkage for integrity and security, oil leakage and looseness of all mounting hardware.

- Inspect the External Scavenge Pump (mounted to the aft side center position of the accessory gearbox), for integrity and security inspect mounting hardware for looseness, inspect all hoses and tubes for leakage and security.

- Inspect the fuel pump assembly and attaching hardware for integrity and security, leaks and mounting hardware for looseness. Inspect all hose assemblies for leakage kinks and bends, ensure the fuel hoses are not chaffing or wire braiding is in tact and not fraying, inspect the high pressure fuel pump filter assembly for looseness of mounting hardware and obvious signs of leakage.

- Inspect the accessory Gear Box mounted oil filter for signs and indication loose or missing fasteners and oil leakage. Inspect housing assembly drain plug for leakage and security.

- Inspect the Main Pressure and Scavenge Pump mounted to the forward center position of the accessory gear box, for security of the mounting hardware, hose adapters, and hoses for cuts chaffing and leakage, inspect the Oil Pressure Regulator for integrity and security and housing assembly for oil leakage.

- Inspect the Speed Sensitive Valve for the security of mounting hardware and fasteners for looseness and missing pieces.

- Inspect the accessory gear box for the security of all mounting hardware and fasteners for loose or missing pieces and especially for signs of synthetic oil leakage.

- Inspect the CDP (Compressor Discharge Pressure) Sensor, inspect the unit for oil leakage and security of mounting hardware.

- Inspect Flexible Hose assemblies for leakage kinks and bends ensure the oil and fuel hoses are not chaffing and wire braiding is in tact and not fraying.

- Inspect for the correct installation and application of safety wire. (Ref. Paragraph 6-44 through 6-9 and Figure 6-4 Safety Wire Installation S9311-C6-MMO-030 Corrective Maintenance Manual.)

MODULE GENERAL

- Inspect all Module Lighting Fixtures ensure to inspect for safety wire on electrical connectors, and the installation of safety wire on light globes, check the globes for security of mounting hardware and that the globes cannot be turned by hand.

- Inspect Engine Handling Rail System in the overhead of the module, inspect all elements for cracks distortion from overloading and the security of the mounting hardware for looseness and fasteners for loose or missing pieces, ensure cross beam is properly secure and in the locked position.

- Inspect the integrity and security of the Module Flame Detectors. (2ea.)

- Inspect perforated sheet metal on the bulkheads and overhead for security and integrity of the elements.

- Inspect acoustical insulation for signs of distortion and deterioration.

- Inspect the Module Temperature Sensor for security and integrity of mounting hardware.

- Inspect the Fuel Wash Drain Header for signs of leakage, dents, or cracked elements, inspect all connections for looseness and leakage.

- Inspect the module Deck Drain System for blockage and debris in the drain strainers.

- Inspect Generator Vent Tubing in the overhead of the module (left side) for integrity and security, ensure that flexible hose connections indicate no signs of leakage twist, bends or wire braiding shows no signs of fraying.

- Inspect Engine Exhaust Drain Collector for obvious mechanical damage, dents, heat distortion, missing or loose mounting hardware, inspect the interior of the collector for indication of oil accumulation.

- Inspect the Low Pressure Fuel Filter assemblies for security of mounting hardware, and fasteners for loose or missing pieces, inspect canisters for leakage, cracks, cuts and drain plugs for security, ensure that flexible hose connections indicate no signs of leakage twist, bends or wire braiding shows no signs of fraying.

- Inspect for the correct installation and application of safety wire. (Ref. Paragraph 6-44 through 6-9 and Figure 6-4 Safety Wire Installation S9311-C6-MMO-030 Corrective Maintenance Manual.)

REDUCTION GEAR COMPARTMENT

- Inspect the Reduction Gear Case Assembly, lower case, mid case and upper casing for split-line leakage, pay particular attention to the module base reduction gear mounting surface. Inspect all mounting fasteners for

looseness of hardware.

- Inspect all bearing RTE cannon plugs ensuring they are tight and secure.

- Inspect PTO (Power Take-Off Shaft) mounting hardware ensuring they are tight and none are missing.

- Inspect MPU (Magnetic Speed Pickup Unit) for integrity and security of mounting hardware, ensure cannon connector is properly attached and secured.

- Inspect Air Turbine Starter Mounting Pad for security and attaching V-Band clamps for proper installation and leakage. Inspect Air Turbine Starter inlet piping for security and indications of start air leakage. Inspect flexible piping for security and separation of wire braiding.

- Inspect mounting hardware for loose or missing pieces.

- Inspect engine Reduction Gear Oil Filter Assembly for indications of leakage, security of mounting hardware and oil piping for leakage.

- Inspect pressure transducer panel and switches for integrity and security, of mounting hardware.

- Inspect all hose and tubing connections for leakage and chaffing.

- Inspect all cannon connectors for proper installation and security.

- Inspect the air reducing station (right hand forward side of the gear compartment) ensure all components are properly installed and no leakage is evident.

- Inspect the Vent Damper Actuation System for security and integrity, inspect all mounting hardware and vanes for obvious mechanical damage and oil leakage from the emergency actuation hand pump.

- Inspect the Icing Detection System ensure both the RTE and Humidity Sensor is correctly installed and secured.

- Inspect the Reduction Gear Component Handling Rail System in the overhead of the module, inspect all elements for cracks distortion from overloading and the security of the mounting hardware for looseness and fasteners for loose or missing pieces, ensure cross beam is properly secure and in the locked position.

- Inspect all Flexible Hose and Tubing Assemblies for security and oil leakage, pay particular attention to the suction and return adapter plates on both the port and starboard sides of the Reduction Gear Assembly.

- Inspect the Engine and Reduction Gear Pre-Lube Pump for integrity and security of all mounting hardware, inspect the pump unit for obvious signs of mechanical damage and leakage.

- Inspect perforated sheet metal on the bulkheads and overhead for security and integrity of the elements. Inspect acoustical insulation for signs of distortion and deterioration.

- Inspect for the correct installation and application of safety wire. (Ref. Paragraph 6-44 through 6-9 and Figure 6-4 Safety Wire Installation S9311-C6-MMO-030 Corrective Maintenance Manual.)

ENCLOSURE EXTERIOR

- Inspect all 14 Module Support Mounts for security and integrity, inspect for signs of cracking and dry rotting fatigue, and inspect for paint damage and corrosion.

- Inspect exterior surfaces of Enclosure Panels for damage warping and signs of mechanical fatigue and corrosion.

- Inspect observation windows and doors (4ea.) for signs of thermal stress moisture behind plexiglass panes and fatigue, inspect window and door gaskets for signs of blow-by and air leakage due to gasket failure.

- Inspect 14th Stage Air Discharge Flexible Piping and thermal blanket for obvious signs of leakage and mechanical thermal fatigue and damage. Inspect all Base Penetration Connections on Module Base (underneath, lower right and lower left sides forward and aft) for indications of leakage signs of fatigue and failure and security of all mounting hardware for loose or missing pieces.

- Inspect all electrical junction boxes internal and external for obvious signs of mechanical damage, and security of all mounting hardware for loose or missing pieces.

- Inspect Generator Assembly for signs of Mechanical Damage including both heat exchangers mounted to the module lower frame and all oil piping and flexible hose assemblies for leakage integrity and security of mounting hardware for loose or missing pieces.

- Inspect Generator Air Cooler Assembly for security and indications of seawater leakage and hose assemblies for signs of chaffing leakage and damage.

- Inspect Generator Pre-lube Pump Assembly for integrity and security of all mounting hardware, inspect the pump unit for obvious signs of mechanical damage and leakage.

- Inspect the Generator oil filters for integrity and security, inspect all mounting hardware for loose or missing fasteners, inspect all associated oil tubing and hoses for damage and leakage.

- Inspect Generator panels for security of mounting hardware for loose or missing pieces and panels for signs of mechanical damage.

- Inspect Unit Start Air Panel, Start Air Valve and associated controls for integrity and security of all mounting hardware.

- Inspect both the Engine Reduction Gear and Generator Oil Sump Tank for leakage and security of all mounting hardware for loose and missing pieces

and all oil piping and flexible hose assemblies for leakage, integrity and security of mounting hardware for loose or missing pieces.

- Inspect the 14th stage Bleed Air Valve for indications of air leakage and all piping and flexible hose assemblies for integrity and security of mounting hardware for loose or missing pieces.

- Inspect for the correct installation and application of safety wire. (Ref. Paragraph 6-44 through 6-9 and Figure 6-4 Safety Wire Installation S9311-C6-MMO-030 Corrective Maintenance Manual.)

ADDENDUM E

Table 505-7-1. COLOR CODE TABLE

Fluid	Valve Handwheel and Operating Lever	FED STD 595 Color Number and Chip	Interior Pipe Lines*
Steam and Steam Drains	White	17886	A and B
Potable Water	Dark Blue	15044	A and B
Nitrogen	Light Gray	16376	A
HP Air	Dark Gray	16081	A
LP Air, MP Air, and Salvage Air	Tan	10324	A
Deballast Air	Striped Tan/Black	10324/17038	B
Oxygen	Light Green	14449	Light Green
Seawater (other than fire main, and sprinkling, includes Main and Secondary Drainage, Waste Drainage, Oily Waste, Distilling Plant Feed, Distilling Plant Brine Overboard, and Countermeasure Wash Down.)	Dark Green	14062	A and B
JP-5	Purple	17142	Purple
Fuel	Yellow	13538	A and B
Lube Oil	Striped Black/Yellow	17038/13538	A
Fire Plugs	Red	11105	A and C
Foam Discharge Plugs (AFFF)	Striped Red/Green	11105/14062	A
Gasoline	Yellow	13538	Yellow
Fresh water, Condensate, Feed, and Distillate (Submarines only)	Dark Blue	15044	A and B
Fresh water, Condensate, Feed, and Distillate (Surface Ships only)	Light Blue	15200	A and B
Primary Coolant and Charging Water (Submarines only)	Light Blue	15200	A and B
Hydraulic	Orange	12246	A
Freon (refrigerant)	Dark Purple	17100	A
Hydrogen	Charteuse	23814	A
Amine	Brown	10080	A
Helium	Buff	10371	A
Helium/Oxygen	Striped Buff/Green	10371/14449	A
Sewage	Gold	17043	A
Halon	Striped Gray White	16187/17886	B and Note 6
Fire Main (including root valves)	Red	11105	A and B
Chilled Water (Submarines only)	Dark Blue	15044	A and B
Chilled Water (Surface Ships only)	Striped Light Blue/Dark Green	150200/14062	A and B

Table 505-7-1. COLOR CODE TABLE - Continued

Fluid	Valve Handwheel and Operating Lever	FED STD 595 Color Number and Chip	Interior Pipe Lines*
Demineralized Electronic Cooling Water (Submarine only)	Dark Blue	15044	A and B
Demineralized Electronic Cooling Water (Surface Ships only)	Striped Light Blue/Dark Purple	15200/17100	B
AFFF Concentrate	Striped Light Blue/Red	15200/11105	B
Access fittings (Submarines only)	Black	17038	
Carbon Dioxide (Submarines only)	Violet		A and B
Jacket Water/Waste Heat	Striped Light Blue/Black	15200/17038	B
AFFF Solution (concentrate and S.W.)	Triped Red/Dark Green	11105/14062	B

SYMBOLS LIST:

A - To avoid conflict between dockside shore connections and shipboard shore connections for teh salme system, no color-socding of shore connection valve handwheels, but label paltes or plain language markings shall clearly delineate the service for each connection.

B - No color-coding.

C - Plug body shall be color-coded

* - Applies to valves on weather decks and interior piping only.

GENERAL NOTES:

1. Valve handwheels and operating levers may be painted with brush or spray using enamel, FED Spec TT-E-489, class A, where surface temperature does not exceed 1805F, but should not be applied in handwheels or levers where they could become immersed, such as in tanks and bilges. Handwheels and levers, where authorized by the Naval Commander also may be coated with plastisol per MIL-P-20689, type I, class 1.
2. If necessary, thin enamel or clean equipment using paint thinner per Commercial Item Description A-A-2904.
3. Surface preparation and priming for application of enamel per TT-E-489, shall be as specified in **NSTM Chapter 631** for the applicable base material.
4. Surface preparation, priming, and application for plastisol per MIL-P-20689, shall be as specified in **NSTM Chapter 631** .
5. Because of potential flammability hazard with enamel per TT-E-489, safety precautions specified in **NSTM Chapter 631** and OPNAVINST 5100.19, **Navy Safety Precautions for the Forces Afloat** , should be adhered to.
6. For color coding of diver life support piping systems, refer to NAVSEA 0994-LP-001-9010, Volume 1, **USN Diving Manual** .
7. To clearly identify oxygen piping within a compartment, submarine oxygen system piping shall be painted dark green using paint in accordance with TT-E-489 and FED-STD-595, no. 14062.